Neural network for classifying student learning characteristics in e-learning

Abstract

Neural Network (NN) is an information processing paradigm that is inspired by the way of biological nervous system, such as the brain that process information received through the senses in the human body. It has been used widely in many applications such as automotive, aerospace, banking, medical, robotics, electronic and transportations. NN is able to learn complex non-linear input-output relationships and is adaptive to environment. NN has been extensively used for user modeling, mainly for classification and recommendation in order to group users with the same characteristics and create profile (Frias-Martinez et al., 2005). Some examples are Bidel, Lemoine, and Piat (2003) which use NN to classify user navigation paths, Stathacopoulou et al., (2006) and Villaverde et.al (2006) which uses NN to assess student's learning style. A problem which arises when trying to apply NN to model human behavior is knowledge representation (Stathacopoulou et al., 2006). The black-box characteristics of NN cannot help much since the weights learned are often difficult for human to interpret. To alleviate the situation, back-propagation network (BPNN) which is a supervised learning algorithm reduced the global error produced by the network over the weight space. This chapter discusses the implementation of BPNN to represent and detect students' learning styles in a web-based education system.

A learning system that provides learning resources according to Felder Silverman (FS) learning style has been developed and tested on University Technology Malaysia (UTM) students taking Data Structure subject. In this chapter, we describe the classification of the student learning styles based on their learning preferences and behavior. Learning style has become a significant factor contributing in learner progress (Magoulas et al., 2003) and has become an important consideration while designing an on-line learning system. It is important to diagnose the students learning style because some students learn more effectively when taught with personalized methods. Information about the learning style can help the system become more sensitive to the differences of students using the system. Understanding learning styles can improve the planning, producing, and implementing of educational experiences, so they are more appropriately tailored to students' expectations, in order to enhance their learning, retention and retrieval (Carver and Howard, 1996).